UNIVERSITY OF RUHUNA

Faculty of Engineering

Mid-Semester 5 Examination in Engineering: June 2014

Module Number: CE5315 **Module Name: Transportation Engineering**

[Two Hours]

[Answer **all questions.**]

The marks assigned for each question is indicated.

All Standard Notations stand for their regular meanings.

Q1. a) Briefly explain the meaning of the statement "Transport has an impact on nation building and national unity. Thus it is used as a political tool."

[1.0 Marks]

b) Demographic composition of an area is one of the drivers of transport. Using suitable examples briefly explain how the composition of a university town can influence the available transportation options available for an area. Name four frequently used transport modes in such a context.

[1.0 Marks]

c) Name two functions of a transportation terminal.

[1.0 Marks]

d) The functional classification classifies highways in to four categories, namely, Expressways, Arterial Roads, Collector (Distributor) Roads and Local/ Access Roads. Briefly describe each of the above four road types by stating their functions and characteristics.

[2.0 Marks]

Q2. a) Briefly explain the meaning of "Space Mean Speed."

[0.5 Marks]

b) Briefly explain two applications of traffic flow theory.

[1.0 Marks]

c) In a traffic survey, two sets of vehicles were timed over a distance of 500 m and the flow rates of these two flow conditions were also recorded . The vehicles have been timed over space as tabulated in Table Q2.

Table Q2 : Flow rate and travel time data of two traffic conditions

Set	Flow Rate (Vehicles/ hour)	Vehicle	Travel Time (s)
Set A	1920	1	35
		2	37
		3	38
		4	39
Set B	1500	1	26
		2	28
		3	32
		4	34

You may use the following equation where necessary.

$Us = nL/\sum_1^n ti$

i) Calculate the space mean speeds of the two sets of vehicles.

[1.5 Marks]

ii) Calculate the density of the stream of the two sets of vehicles using basic traffic flow equation.

[1.5 Marks]

iii) Assuming the flow condition of the above road can be approximated by Greenshield's model which assumes a linear relationship between density of the flow and speed, estimate the free flow speed, optimum flow rate and jam density for this flow. You may use any equation related to Greenshield's model without deriving.

[2.5 Marks]

Q3. a) List out two applications of traffic incident analysis relevant to a transportation engineer.

[1.0 Marks]

b) The speed density relationship for a two lane road is given as,
$U = 50 - 0.5K$,
When the speed was 40 kmph a tree fell across the road completely stopping the vehicle flow. The tree was cleared after 1 minute.

i) Draw the shock wave diagrammes for the above traffic incidence. Name different shock waves.

[3.5 Marks]

ii) Calculate the maximum affected distance, and time at that point (time taken for the two backward shock waves to intersect).

[1.0 Marks]

iii) Calculate the maximum queue length.

[1.0 Marks]

iv) Calculate the number of vehicle in the queue after 30 seconds from the beginning of the incidence.

[1.5 Marks]